trilobite by Mr. W. D. Matthew, it has been possible, with the new material supplied to the Yale Museum, to trace its development back to the earlier stages. Larval specimens have been found in which the thorax is undeveloped and the cephalon predominates, while the other parts are not clearly differentiated. The larva is ovate in outline. The frontal margin is marked by a convex fold of the test. The axis is annulated. Near the lateral anterior margins are two slight elevations which may represent the palpebral lobes of the eyes.

*American Journal of Mathematics*, vol. xv. No. 4.—On toroidal functions, by A. B. Basset (pp. 287-302). The theory of these functions was first investigated by Prof. W. M. Hicks, in his discussion of the motion of circular vortex rings (*Phil. Trans.* 1881). The author considers that Prof. Hicks presented the subject in a somewhat complicated form, and the object of his own communication is to develop the subject, and to correct errors which he attributes to Prof. Hicks. The memoir appears to be on the lines of a communication Mr. Basset made to the London Mathematical Society (April 13, 1893).—Simple groups as far as order 660, by F. N. Cole (pp. 303-315). This is a continuation of a paper in vol. xiv., in which it was shown that the orders of simple groups between the limits 200 and 500 are restricted to two possibilities, 360 and 432. In the present memoir the order 432 is shown to be inadmissible, and the order 360 to furnish only one type of a simple group. Two other simple groups are shown to present themselves, of orders 504 and 660 respectively. The order 504 "seems hardly to have been recognised hitherto." It was a singular fact, pointed out at the November meeting of the London Mathematical Society, that this memoir anticipated some results in Prof. W. Burnside's notes on the theory of groups of finite order. The latter had evidently arrived at his result quite independently of Dr. Cole.—On the expansion of functions in infinite series, by W. H. Echols (pp. 316-320).—The elliptic inequalities in the lunar theory, by E. W. Brown (pp. 321-338). This is a resumption of the author's paper from p. 263.—On the multiplication of semi-convergent series, by F. Cajori (pp. 339-343). The writer's object is to extend results given by A. Voss, in the *Math. Ann.* (vol. xxiv. p. 44).—On certain ruled surfaces of the fourth order, by T. F. Holgate (pp. 344-386). An introductory section is historical, and refers to previous memoirs on the subject. The author considers those species of the surface of the fourth order which may be generated by two projective sheaves of planes of the second order. These admit of a trinodal quartic section, and are consequently of deficiency zero. The volume concludes with a note on the so-called quotient G/H in the theory of groups by Prof. Cayley, (pp. 387-8), and the index of contents.

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## *SOCIETIES AND ACADEMIES.*

### LONDON.

**Physical Society**, November 10.—Prof. A. W. Rücker, F.R.S., President, in the chair.—A paper on the separation of three liquids by fractional distillation, by Prof. F. R. Barrell, G. L. Thomas, and Prof. Sydney Young, F.R.S., was read by Prof. Young. Accepting the results obtained by F. D. Brown in his experiments on the variation in the composition of the distillate from a mixture of two liquids, viz. that the relative quantities of the two substances in the vapour at any instant are proportional to the weights of the substances in the still, multiplied by the ratio of their vapour pressures, the authors write Brown's equation in the form $\frac{d\xi}{d\eta} = c\frac{\xi}{\eta}$, where $\xi$ and $\eta$ are the weights of the two liquids in the still, and $c$ the ratio of their vapour pressures. Taking $c$ as constant, the above equation is integrated, and from the resulting expressions curves are plotted showing the changes in composition that take place during the distillation. Assuming that a similar law holds for three liquids, A, B, and C, viz. $\frac{1}{a}\frac{d\xi}{\xi} = \frac{1}{b}\frac{d\eta}{\eta} = \frac{1}{c}\frac{d\zeta}{\zeta}$, the composition of the distillate at any instant is calculated. Taking $a = 4$, $b = 2$, and $c = 1$ (numbers nearly proportional to the vapour pressures of methyl, ethyl, and propyl acetates), numerous curves are plotted showing the progress of the separation at various stages of fractionation. These curves show distinctly that although fractions containing large proportions of the liquids A and C, of lowest and highest boiling points respectively, can be easily separated, the middle substance, B, is much more difficult to obtain in a state of purity. Consideration of these curves led the authors to see that by carrying out the fractionation in a particular way, it was possible to separate the mixture into two portions, one containing only A and B, and the other B and C. These mixtures of two liquids could then be fractionated in the usual manner. This process was carried out on a mixture of methyl, ethyl, and propyl acetates, the results of which are given in considerable detail in the paper. The remarkable agreement between the densities of the ethyl acetates obtained respectively from the mixtures A and B, and B and C, as well as the fact that the densities of the separated liquids were the same as before the mixing, show conclusively that the method employed was highly successful. Prof. Ramsay said the paper was a most valuable one, and would be a great aid to chemists. Distillations were usually carried out by mere "rule-of-thumb," with the result that absolutely pure liquids could rarely be obtained. The President inquired whether curves representing the progress of distillation could be constructed from the very complete experiments made, and so test the assumed law. Prof. Young thought this not possible from the numbers obtained. To test the law in this way would be very laborious.—A note on the generalisations of Van der Waals regarding "corresponding" temperatures, pressures, and volumes, was read by Prof. S. Young. In November 1891 the author read a paper on the same subject (*Phil. Mag.* February 1892), and gave the critical molecular volumes of some twelve substances as calculated by M. Mathias. Since then a few small errors have been found in the calculation, and the authors' corrected values are now given. The vapour pressures, molecular volumes and critical constants of ten esters (methyl formate, acetate, propionate, butyrate, and isobutyrate, ethyl formate, acetate and propionate, and propyle formate and acetate) have recently been determined (Trans. Chem. Soc. lxiii. p. 1191). In the present paper the absolute temperatures and volumes of the twelve substances are given in terms of their critical constants, and tables given showing, respectively, the ratios of boiling points (abs. temps.) at corresponding pressures, to absolute critical temperatures; the ratios of volumes of liquid at corresponding pressures to the critical volumes, and ratios of volumes of saturated vapours at corresponding pressures to critical volumes, for the halogen derivatives of benzene, carbon tetrachloride, stannic chloride, ether; methyl, ethyl, and propyl alcohols, and acetic acid; and the extreme values for the ten esters previously mentioned. Whilst showing fair agreement with each other, the differences between them exceed errors of experiment. The ratios also indicate that the substances can be arranged in four groups, thus tending to show that molecular weight and chemical constitution have some influence on the results. The differences found would probably result from the presence of complex molecules, such as are known to exist in acetic acid. If Van der Waals's generalisations were strictly true, the ratio $\frac{pv}{T}$ at the critical point should be constant for all substances, as also the ratio $\frac{D}{D'}$ of the actual to the theoretical density (for a perfect gas) at the critical point. On comparing these quantities only a rough approximation is found, but the grouping of the compounds is again well marked. Prof. Ramsay was not sure that the existence of complexes would alter the molecular volume in the liquid state, for liquids seem very compact. Experiments on the surface energy of liquids had proved that complex molecules do exist in the alcohols and acetic acid. Dr. Young's conclusions were therefore confirmed by experiments of an entirely different nature. Prof. Herschel was gratified to see Van der Waals's theory so well borne out in liquids, and hoped to see it extended to solids. The recent researches of Prof. Robert Austen on alloys seemed to point in this direction. Mr. Rogers said molecular complexes do exert an influence on the properties of substances, as had been shown by Prof. Thorpe's viscosity experiments. Van der Waals's generalisations should therefore be looked at from a chemical as well as a physical point of view. The President thought the number brought forward showed fair agreements, especially when it was remembered that Van der Waals took no account of complex molecules. Contrary to Prof. Ramsay, he would rather expect aggregation to affect the molecular volumes in the liquid state, for only about one-fifth the space was supposed to be occupied by matter. On the other hand, the relatively small contraction of liquids on cooling did not support this view.—An instrument for drawing conic sections was exhibited and described by Mr. J. Gillett. This consists of a spindle inclined to a plane board, and a tube fixed to the spindle at an angle. A pencil which passes through the tube traces out a cone in space as the spindle is turned, and on sliding the pencil through the tube, so as to keep its point against the plane, the point traces out a conic, the section of the cone made by the plane of the board. A circle, ellipse, parabola, or hyperbola, can be drawn according to the inclination of the spindle to the board. Prof. Henrici said a similar instrument had been described in an Arabian manuscript a thousand years old, and has been independently re invented by both a German and an Italian mathematician. He thought the fact of the angle between the spindle and the tube in Mr. Gillett's instrument not being adjustable was a disadvantage. Mr. Inwards and Prof. Herschell also took part in the discussion, to which Mr. Gillett replied.

**Geological Society**, November 8.—W. H. Hudleston, F.R.S., President, in the chair.—The following communications were read:—The geology of Bathurst, New South Wales, by W. J. Clunies Ross. After sketching the physiography of the Bathurst district, the author described in detail its stratigraphy. The oldest sedimentary rocks are Silurian, but the floor on which they rest is unknown, and the author stated that it was probably fused up and incorporated in the granite, which is described in the paper. The Silurian rocks may have been folded before the granite was erupted; in any case, the granite produced a zone of contact-metamorphism, whilst almost all the Silurian rocks may be considered to be examples of regional metamorphism, though the agents producing the metamorphism were least active to the east of Bathurst, where the Silurian limestones are very little altered. An anticlinal was probably produced at the time of the granitic intrusion. After a time there was subsidence, but at first it need not have been very extensive, since the Devonian conglomerates, sandstones, and shelly limestones were probably deposited in a comparatively shallow sea. They contain *Lepidodendron australe*. At Rydal they abut against the uplifted Silurian rocks of the Bathurst area. At the end of Devonian times there appears to have been a long interval, during which both Silurian and Devonian rocks were greatly denuded, and the granite exposed in places. The Upper Carboniferous and Permian rocks were deposited in the Lithgow district, but it is doubtful if they ever extended to Bathurst. There is nothing to show what happened in this region during Mesozoic and early Tertiary times. The Hawkesbury Sandstone (probably Triassic) may have approached nearer to Bathurst than it does now. In late Tertiary times stream-deposits were formed on the granitic rocks, and afterwards covered with thick basaltic lava-flows, which have since undergone much denudation. A discussion followed, in which the President, the Rev. H. H. Winwood, and Mr. J. E. Marr took part.—The geology of Matto Grosso (particularly of the region drained by the Upper Paraguay), by Dr. J. W. Evans. The district includes a portion of the Brazilian hill-country, and also of the low-lying plains to the south-west The rocks principally dealt with are unfossiliferous, and of unknown age, except that they appear to be older than the Devonian. They may be classified as follows:—(5) Matto Shales (relations not shown); (4) Rizama Sandstone (perhaps some unconformity); (3) Curumbá and Arara Limestones (very marked unconformity); (2) Cuyabá Slates (strong unconformity); (1) ancient crystalline rocks. The Devonian and later rocks were briefly described. The President, Mr. Spencer Moore, fellow-traveller with Dr. Evans in Matto Grosso, Mr. H. Bauerman, and Mr. R. D. Oldham spoke on the subject of the paper.—Notes on the occurrence of mammoth-remains in the Yukon district of Canada and in Alaska, by Dr. George M. Dawson, C.M.G., F.R.S. In this paper various recorded occurrences of mammoth-remains were noted and discussed. The remains are abundant in, if not strictly confined to, the limits of a great unglaciated area in the north-western part of the North American continent; whilst within the area which was covered by the great ice-mass which the author has described as the Cordilleran glacier, remains of the mammoth are either entirely wanting or are very scarce. At the time of the existence of the mammoth the North American and Asiatic land was continuous; for an elevation of the land sufficient to enable the mammoth to reach those islands of the Bering Sea, where these bones have been found, would result in the obliteration of Bering Straits. The bones occur, along the northern coast of Alaska, in a layer of clay resting on the somewhat impure "ground-ice formation" which gives indications of stratification; and above the clay is a peaty layer. The author considered this "ground-ice" was formed as a deposit when more continental conditions prevailed, by snow-fall on a region without the slopes necessary to produce moving glaciers. The mammoth may be supposed to have passed between Asia and America at this time. At a later date, when Bering Straits were opened and the perennial accumulation of snow ceased on the lowlands, the clay was probably carried down from the highlands and deposited during the overflow of rivers. Over this land the mammoth roamed, and wherever local areas of decay of ice arose bogs would be produced which served as veritable sink traps. The author considered it probable that the accumulation of "ground-ice" was coincident with the second (and latest) epoch of maximum glaciation, which was followed by an important subsidence in British Columbia. In the discussion of the paper, Sir Henry Howorth remarked upon the long and careful survey of North-West America which has been made by the author, and upon the value of the conclusions which he has come to: firstly, in regard to the absence of ancient glaciation in Alaska and its borders; secondly, in regard to the existence of a great glacier in the Cordilleras, whose products are quite independent of and have nothing to do with the Laurentian drift; and thirdly, in regard to the distribution of the mammoth. It was a new fact to him, and one of great importance, that mammoth-remains had occurred in Unalashka and the Pribilof Islands in Bering Straits, proving that in the Mammoth age there was a land bridge here, as many inquirers had argued. It would be very interesting to have the western frontier defined where the mammoth-remains cease to be found. It would be very interesting to know how far south on the west of the Cordilleras the true mammoth, as distinguished from *Elephas Columbi*, has occurred. Regarding one conclusion of Dr. Dawson's, Sir Henry could not agree with him, namely, about the age of the strata of ice sometimes found under the mammoth-beds in Alaska as they have been found in Siberia. The speaker was of opinion that this ice had accumulated since the beds were laid down, and was not there when the mammoth roamed about in the forests where he and his companions lived. Humus and soil cannot accumulate upon ice except as a moraine, and there are no traces of moraines or of great surface-glaciation in Alaska and Siberia. Nor could either the flora or fauna of the memmoth age have survived conditions consistent with the accumulation of these beds of ice almost immediately below the surface, or consistent with their presence there. The speaker considered that these beds were due to the filtration of water in the summer down to the point where there is a stratum of frozen soil, through which it cannot pass and where it consequently accumulates, freezes, raises the ground, and in the next season grows by the same process until a thick bed of ice has been formed. The evidence goes to show that the present is the coldest period known in recent geological times in Siberia and Alaska, and that the period of the mammoth and its companions was followed and not preceded by an Arctic climate where its remains occur. Dr. H. Woodward remarked that the most interesting point in Dr. Dawson's paper was the mention of the remains of mammoth on the Aleutian Islands, proving that this was the old high road for this and other mammals from Asia into North America in Pleistocene times.

**Linnean Society**, November 2.—Prof. Stewart, President, in the chair.—The secretary having read a list of the donations to the library since the last meeting, the President moved that the thanks of the society be given to the donors and to Lady Arthur Russell for the valuable collection of engraved portraits of naturalists which she has been so good as to present to the society in the name of her husband, the late Lord Arthur Russell, a motion which was passed unanimously. The President then referred to the improvement which had been carried out during the recess in the society's apartments by the introduction of the electric light, for which they were indebted to the liberality of the treasurer, Mr. Crisp, who on former occasions had shown himself so generous a benefactor, and moved that the hearty thanks of the society be given to Mr. Crisp for his munificent present. The resolution was carried by acclamation. Referring to the deaths of Fellows of the society which had occurred since the last meeting, the President alluded especially to the Rev. Leonard Blomefield, whose connection with the society, extending over seventy years, had recently been made the subject of a congratulatory address, to Mr. F. Pascoe, the distinguished entomologist, and to Mr. George Brook, whose lamented decease had caused the vacancy in the Council which they now had to fill. The ballot having then been taken for the election of a new councillor in the place of Mr. George Brook, deceased, Mr. Henry Seebohm was declared to have been elected.—Mr. George Murray exhibited and made remarks on a series of seaweeds mounted on lantern slides, some of which were new to Great Britain. He also showed some specially prepared tins which were recommended for collecting purposes, but which in the opinion of some present would be likely to become speedily useless from oxidisation.—Mr. Holme showed some new British marine algæ, and made remarks on their affinities.—Dr. Prior exhibited the fully developed fruit of *Pyrus japonica* from Rogate, Sussex, seldom seen, although the plant is common, and alluded to its use as a conserve if it could be obtained in sufficient quantity.—Mr. Spencer Moore read a paper on the phanerogamic botany of an expedition to Mato Grosso, upon which he acted as botanist. Starting from Cuyaba, the expedition first visited the Chapada Plateau, to the east of that city, where many plants were collected. Thence a journey was made to the new settlement of Santa Cruz, on the Paraguay, about half-way between Villa Maria and Diamantino. The flora here is of mixed character, nearly 37 per cent. of the plants being common to tropical South America, upwards of 27 per cent. occurring in the N. Brazil Guiana province of Engler, with 20·5 per cent common to that province and the S. Brazilian, and only 13 per cent. of S. Brazilian types. From Santa Cruz a party penetrated through the primeval forest lying to the north, and reached the Serra de Sapirapuan. The forest flora is markedly Amazonian in character, nearly 50 per cent. of the plants being natives of Amazonia or of the neighbouring countries within the N. Brazil Guiana province, or related thereto, while the proportion of species common to tropical America falls to rather more than 28 per cent. the S. Brazilian element being present only to the extent of 9·5 per cent. Returning to Santa Cruz, the Rio Bracisto was partly explored, and the Paraguay ascended to the neighbourhood of Diamentino. The party then came down the Paraguay to the Corumba, where many plants of interest were found. The expedition was partly disbanded at Asuncion. Among the Amazonian plants found at Santa Cruz, or in the forest, may be mentioned *Randia Ruiziana*, *Bertiera guianensis*, the Loranthad *Oryctanthes ruficaulis*, *Cattleya superba*, *Epidendrum imatophyllum*, *Rodriguezia secunda*, &c. The collections comprise close upon 700 species, of which rather more than 200 were considered to be new, and referable to eight new genera. The southward extension of the Amazonian flora to a latitude well within the Paraguay River system was regarded as a noteworthy feature.—On behalf of Mr. G. M. Thomson, of Dunedin, N.Z., Mr. W. Percy Sladen read a paper on a new freshwater Schizopod from Tasmania, illustrating his remarks with graphic sketches on the blackboard to indicate its affinities and differences.

**Entomological Society**, November 8. — Henry John Elwes, President, in the chair.—Mr. F. Merrifield exhibited some low-temperature forms of *Vanessa atalanta*, artificially produced, which showed a great reduction in the area of the scarlet bands on the wings, and a great increase in the area of the white and bluish markings.—Prof. E. B. Poulton, F.R.S. described and illustrated, by means of a map, a simple method for showing the geographical distribution of insects in collections. Below the name-label of the genus, and of each species, were placed coloured slips of such a size as to be distinctly visible at a distance, and the colours, with one exception, corresponded with those made use of in the map at the beginning of vol. i. of Dr. A. R. Wallace's "Geographical Distribution of Animals." The exception referred to was the Palæarctic region, which was coloured blue, instead of pale brown as in the original. Framed maps of the same kind, and coloured in the same way as the one he exhibited, were to be placed in museums, so as to be readily seen from various groups of cabinets. In these maps the names of the regions, and numbers of the sub-regions, were distinctly printed, so that they could be read at a considerable distance. Prof. Poulton added that the method he had described was being gradually introduced into the Hope Collections at Oxford. Mr. McLachlan, F.R.S., stated that a somewhat similar plan to that described for showing the geographical distribution of insects has been adopted in the Brussels Museum by M. Preudhomme de Borre. Mr. W. F. H. Blandford, Dr. D. Sharp, F.R.S., Mr. C. J. Gahan, Mr. C. O. Waterhouse, Mr. Osbert Salvin, F.R.S., Prof. Poulton, and the President continued the discussion.—Dr. Sharp read the following extract from Dr. Livingstone's "Narrative of an Expedition to the Zambesi," and stated that he was indebted to Mr. Gahan for calling his attention to it:—"We tried to sleep one rainy night in a native hut, but could not because of attacks by the fighting battalions of a very small species of *Formica*, not more than one-sixteenth of an inch in length. It soon became obvious that they were under regular discipline, and even attempting to carry out the skilful plans and stratagem of some eminent leader. Our hands and necks were the first objects of attack. Large bodies of these little pests were massed in silence round the point to be assaulted. We could hear the sharp, shrill word of command two or three times repeated, though until then we had not believed in the vocal power of an ant; the instant after we felt the storming hosts over head and neck."—Prof. Poulton read a paper entitled "On the sexes of larvæ emerging from the successively-laid eggs of *Smerinthus populi*." Mr. Merrifield, Dr. Sharp, and the President took part in the discussion which ensued.—Mr. W. L. Distant communicated a paper entitled "On the Homopterous genus *Pyrops*, with descriptions of two new species."—The President read a paper, written by himself and Mr. J. Edwards, entitled "A revision of the genus *Œneis*," which he characterised as the most cold-loving genus of butterflies. He also exhibited his complete collection of species of this genus. A long discussion ensued, in which Prof. Poulton, Mr. McLachlan, Mr. Salvin, Mr. Bethune-Baker, the Rev. Dr. Walker, Mr. Kirby, Mr. Merrifield, Mr. Barrett, Mr. Blandford, Dr. Sharp, and Mr. Jacoby took part.

**Zoological Society**, November 7.—Sir W. H. Flower, K.C.B., F.R.S., President, in the chair.—Mr. Sclater read some notes on the most interesting animals he had seen during a recent visit to the Zoological Gardens of Stuttgart, Frankfort, and Cologne.—An extract was read from a letter addressed to the Secretary by Mr. J. G. Millais, relating his endeavours to obtain specimens of the White Rhinoceros (*Rhinoceros simus*) in Mashonaland.—A communication was read from Babu Ram Bramha Sányál, describing a hybrid monkey of the genus *Semnopithecus*, born in the Zoological Gardens, Calcutta.—Mr. Tegetmeier exhibited a specimen of a hybrid grouse between the blackgame (*Tetrao tetrix*) and the red grouse (*Lagopus scoticus*). — Mr. Boulenger read a paper on a Nothosaurian reptile from the Trias of Lombardy, apparently referable to *Lariosaurus*. His description was based on a small, nearly perfect specimen from Mount Perledo, showing the ventral aspect, belonging to the Senckenberg Museum in Frankfort-on-Main, which had been entrusted to him by the directors of that institution, and was exhibited before the meeting. The author pointed out the presence of a series of minute teeth on the pterygoid bones, and of an entepicondylar (ulnar) foramen in the humerus. The number of phalanges was 2, 3, 4, 4, 3 in the manus, and 2, 3, 4, 5, 4 in the pes; the terminal phalanx was flattened and obtusely pointed, not claw-shaped. In discussing the affinities of this reptile the author stated that the *Lariosaurus* described by Diecke did not appear to be generically distinguishable from the *Neusticosaurus* of Seeley, which he referred to the *Lariosauridæ*, regarding that family as intermediate between the *Mesosauridæ* and the *Nothosauridæ*, though nearer the latter. The *Mesosauridæ*, in his opinion, formed one sub-order, the *Lariosauridæ* and *Nothosauridæ* together a second sub-order, of the order *Plesiosauria*.—Dr. A. Günther, F.R.S., read a second report on specimens of reptiles, batrachians, and fishes transmitted by Mr. H. H. Johnston, C.B., from British Central Africa. Dr. Günther also read descriptions of some new reptiles and fishes, of which specimens had been obtained on Lake Tanganyika by Mr. E. Coode-Hore.—Mr. Edgar A. Smith gave an account of a collection of land and freshwater shells transmitted by Mr. H. H. Johnston, C.B., from British Central Africa. The specimens in this collection, obtained by Mr. R. Crawshay from Lake Mweru, were almost all new to science.—Mr. Edgar A. Smith also read descriptions of two new species of shells of the genus *Ennea*.—A communication was read from Dr. Arthur G. Butler, containing an account of two collections of Lepidoptera sent by Mr. H. H. Johnston, C.B., from British Central Africa.—A communication was read from Mr. Edwyn C. Reed, containing a list of the Chilian Hymenoptera of the family *Odyneridæ*, with descriptions of some new species.—A communication from Prof. Newton, F.R.S. contained the description of a new species of bird of the genus *Drepanis*, discovered by Mr. R. C. L. Perkins in the island of Molokai, Sandwich Islands.

### PARIS.

**Academy of Sciences**, November 13.—M. Lœwy in the chair.—On the new star of 1892, T Aurigæ = 1953 Chandler, by G. Bigourdan (see our Astronomical Column).—Observations of the comets 1893 II. (Rordame) and 1893 *c* (Brooks, 1893, October 16), made at the Paris Observatory, by the same author. Observations of position are given, extending from November 6 to 8.—Elements of Brooks's comet, by M. Schulhof. The elements of this comet closely resemble those of the comet 1864 I.—Control of the trunnions of a meridian instrument by Fizeau's interferential method, by Maurice Hamy.—Measurement of the absorption of light by thin laminæ possessing metallic reflection, by M. Salvador Block.—Determination of the true atomic weight of hydrogen, by M. G. Hinrichs. Taking as abscissæ the weights of hydrogen employed by Keiser, Dittmar, and Morley, in their respective determinations of the atomic weight of hydrogen, and as coordinates the values found, the author has obtained a diagram which indicates that the values vary according to the weight of gas used in the experiments. In his opinion this proves that the ratio of H to O is absolutely as 1 is to 16.—On baryta emetic, by M. E. Maumené.—On the production of sucrose during the fermentation of barley, by M. L. Lindet. The experiments described indicate that sucrose and invert-sugar increase proportionally to the decrease of starch during the fermentation of barley.—On the nitrification of prairie lands, by MM. J. Dumont and J. Crochetelle. The following conclusions seem to be justified by the experiments: (1) Nitrification is forwarded in soils rich in humus by the addition of small quantities of potassium carbonate (2 or 3 parts per 1000); on the other hand, large quantities of the carbonate are hurtful. (2) Potassium sulphate is efficacious, and favours the production of nitrates when about seven or eight parts per thousand are used. (3) Chloride of potassium only exercises mediocre action. (4) Sodium carbonate does not appear to favour nitrification.—On the influence of mineral poisons on lactic fermentation, by MM. A. Chassevant and C. Richet. This paper is in continuation of a previous one. The authors divide the toxic action of metallic salts on lactic fermentation into two parts, terming the dose that retards the reproduction and pullulation of the ferment *antigénétique*, while that which arrests functional activity is called *antibiotique*. It appears that the antigentic dose may be as much as three times greater than the antibiotic dose, though for certain metals the two quantities are the same.

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## DIARY OF SOCIETIES.

### LONDON.

*THURSDAY*, NOVEMBER 23.

ROYAL SOCIETY, at 4.30.—On the Photographic Arc Spectrum of Electrolytic Iron: Prof. Lockyer, F.R.S.—Magnetic Observations in Senegambia: Prof. Thorpe, F.R.S., and P. L. Gray.—Alternate Current Electrolysis: Dr. Hopkinson, F.R.S., E. Wilson, and F. Lydall.—A Certain Class of Generating Functions in the Theory of Numbers: Major MacMahon, F.R.S.—On the Whirling and Vibration of Shafts: S. Dunkerley.—On Plane Cubics: Charlotte Angas Scott.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Electrical Transmission of Power from Niagara Falls: Prof. Geo. Forbes, F.R.S. (Discussion).

SANITARY INSTITUTE, at 8.—Metallic Dusts, Cutlery, Tool Making, and other Metal Trade: Dr. Sinclair White.

*FRIDAY*, NOVEMBER 24.

PHYSICAL SOCIETY, at 5.—The Magnetic Shielding of Concentric Spherical Shells: Prof. A. W. Rücker, F.R.S.—The Action of Electro-Magnetic Radiation on Films containing Metallic Powders: Prof. G. M. Minchin.

AMATEUR SCIENTIFIC SOCIETY, at 7.—Exhibition of Lantern Slides of Recent Photographs of Volcanoes: L. W. Fulcher.——At 8.—The Dawning of Life: J. Wilson Wiley.

*SATURDAY*, NOVEMBER 25.

ROYAL BOTANIC SOCIETY, at 3.45.

*SUNDAY*, NOVEMBER 26.

SUNDAY LECTURE SOCIETY, at 4.—Curiosities of Bird Life: Dr. R. Bowdler Sharpe.

*MONDAY*, NOVEMBER 27.

ROYAL GEOGRAPHICAL SOCIETY (at the University of London, Burlington Gardens, W.), at 8.30.—Antarctic Exploration: Dr. John Murray.

*TUESDAY*, NOVEMBER 28.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Tansa Works for the Water-Supply of Bombay: William J. B. Clerke.—The Baroda Water-Works: Jagannath Sadasewjee.—The Water-Supply of Jeypore, Rajputana: Colonel S. S. Jacob.—On the Design of Masonry Dams: Prof. Franz Kreuter. (Discussion.)

*THURSDAY*, NOVEMBER 30.

SANITARY INSTITUTE, at 8.—Textile Manufactures, Silk, Cotton, Woollen, and Linen Industries: Dr. J. T. Arlidge.

*FRIDAY*, DECEMBER 1.

GEOLOGISTS ASSOCIATION, at 8.—Notes on a Discovery of Fossils at Little Stairs Point, Sandown Bay, Isle of Wight: Thos. Leighton.—Notes on the Sharks' Teeth from British Cretaceous Formations: A. Smith Woodward.—The Breaking-up of the Ice on the St. Mary River, Nova Scotia, and its Geological Lessons: Geoffrey F. Monckton.

INSTITUTION OF CIVIL ENGINEERS, at 7.30.—Forms of Tensile Test-Pieces; Leonard H. Appleby.

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## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

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